Apparatus and Optical Division
Development and Engineering Department
SAMPLE LENS REPORT

STATINTL

No.: #152-104
Issued by: Optical Engineering Dept. #152
Prepared by: [redacted] STATINTL
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Approvals:

Subject: Formula M-236, 50mm, f/2.0 Cathode Ray Tube Lens for [redacted] Factory Order #60621 STATINTL

1. Scope & Use:

This report covers the results obtained from eight subject lenses manufactured in accordance with Apparatus & Optical Division Engineering Drawing SK-10064-1 and tested per [redacted] Drawing #823517. STATINTL

The lens design is an eight element, Gauss-type, objective achromatized at m-g(365 and 435 mμ) for use with P-16 phosphors. The lenses were adjusted* for optimum field curvature for the required 6:1 magnifications and 15° semi-field.

* In addition to the normal S_3 adjustment, it was necessary to increase S_4 by approximately .14mm.

2. Conclusion:

The lens performance, except as noted, is in accordance with the specifications. Based on the tests performed, the lenses appear to be well made and should be very satisfactory for their intended use.

NOTE: With the exception of the 10° field position at f/2.0, the lens performance is well within the resolving power desired. Five reach the desired resolution of 50 lines/mm across at least one diagonal. The remaining three lenses resolve 46 line/mm at 10° across at least one diagonal. The minimum resolving power at 10° for any lens is 41 lines/mm.

The best diagonal position has been marked by a red dot on the mounting flange.

3. Test Procedure:

3.1 Resolving Power:

(a) Each lens was tested through focus at f/2.0 across three equally spaced (120°) diagonals.

(b) Each lens was tested through focus at f/4.0 across the best diagonal as determined by the f/2.0 tests.

Test Conditions:

Magnification	-	6:1
Focus Increments	-	.0004" (.01mm) through Focus
Paper	-	Kodabromide F-4
Target	-	Trans-illuminated 3 line, √2, Black on Clear, Air Force Resolving Power Charts spaced at 0°, 5°, 10° and 15°.

Test Conditions: (Continued)

Illumination	-	P-16 equivalent (G.E. Purple-X Bulb)
Exposure	-	f/2.0: 2.0 seconds f/4.0: 8.0 seconds
Glass	-	1/8" Thick Plate in Image Plane
Processing	-	1 1/2 minutes in Dektol 2:1 at 68°F

Please see tables below for values of minimum resolution in lines/mm at the plane of best resolution for the diagonals listed.

3.1.1 f/2.0 Aperture

Lens#	Diag.	Position from B.V.F.	Test Angle 0°	5°	10°	15°
0Y001	1	-.02	182	114	41	51
	2	-.02	162	114	51/46	57
	3	-.02	182	114	46	46
0Y002	1	-.02	162	114	51	64
	2	-.02	204	114	51	57
	3	-.02	204	102	41/51	46
0Y003	1	0	162	91	46/41	51
	2	0	162	144	64	64
	3	0	182	81	51/41	64
0Y004	1	-.02	*128	102	51	64
	2	-.02	162	91	46/57	46
	3	-.02	162	114	51	64
0Y005	1	-.01	162	114	51/41	57
	2	-.01	162	114	51	46
	3	-.01	182	114	51	51
0Y006	1	-.04	162	114	46	51
	2	-.04	182	91	41/46	46
	3	-.04	182	128	41/46	41
0Y007	1	-.01	182	91	46	57
	2	-.01	182	81	41/51	57
	3	-.01	182	81	41	46
0Y008	1	-.03	162	114	51	57
	2	-.03	182	114	41	57
	3	-.03	162	114	46/57	51

*Obviously caused by noise in test system.

3.1.2 f/4.0 Aperture

Lens #	Diag.	Test Angle 0°	5°	10°	15°
0Y001	2	182	182	72	46
0Y002	1	228	182	64	46
0Y003	3	182	182	72	64
0Y004	3	162	162	81	64
0Y005	2	162	182	64	46
0Y006	2	182	162	64	46
0Y007	1	162	162	72	46
0Y008	1	182	204	81	57

3.2 Lens Bench Data:

The following infinite measurements were taken with a 47B Wratten Filter.

Lens #	Axial Image	Equivalent Focus (mm)	Back Focus (mm)
0Y001	Good	49.20	29.50
0Y002	Good	49.25	29.55
0Y003	Good	49.15	29.45
0Y004	Good	49.15	29.35
0Y005	Good	49.20	29.50
0Y006	Good	49.20	29.55
0Y007	Good	49.25	29.55
0Y008	Good	49.20	29.50

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